ELECTRICAL CONDUCTIVITY METER (EC METER)

PRINCIPLE

EC meter measures the electrical conductance of any solution containing inorganic soluble salts. In general, more the concentration of salts present in water more will be the intensity of current (flow of electron) passing through it.

Apparatus and chemicals

Beaker, Conductivity meter, Potassium chloride,

PROCEDURE

Standardization of EC meter

Prepare 0.01 N KCl solution (0.745 g KCl L^{-1}) in to volumetric flask and transfer the KCl solution in to 250 mL baker. Now put the electrode of EC meter in to a beaker (having KCl solution) and observe the reading at 25 °C if the value of Cell Constant (K) is one then it means that EC meter is working correctly. If EC is different then Cell Constant (K) will be calculated as:

$$Cell\ Constant\ (K) = \frac{1.4118\ \text{dS m} - 1}{\text{Observed EC of KCl solution}}$$

If Cell Constant (K) is different (if not one) then value EC of unknown sample should be multiplied with value of Cell Constant. For example EC value of a sample is 2.0 dS m^{-1} and Cell Constant (K) is 1.23 then final reading of sample will be 2.0 dS m^{-1} * 1.09 = 2.18 dS m^{-1}.

Units of EC

Higher the salt concentration lesser the resistance to the flow of current. The resistance (R) is defined by the Ohm's Law as the ratio of electrical potential (E) in Volts and strength of the current (I) in amperes:

$$R\ (Ohms) = \frac{\text{E}}{\text{I}}$$

Conductivity (C) is the reciprocal of resistance i.e.

$$C\ (mhos) = \frac{\text{I}}{\text{R}}$$

Ohm when written in reverse order becomes mhos; the unit of conductance. Since both the platinum plates in the cell are 1 cm apart thus the unit (old) is written as mhos cm-1 at standard temperature 25 °C.

Old Units:

- EC = mhos / cm at 25 °C
- EC * 10^3 = mmhos / cm at 25 °C
- EC * 10^6 = µmhos / cm at 25 °C

New Units:

- EC: mhos / cm = S m^{-1}
- EC: mhos / cm = dS m^{-1}

Estimation of total soluble salts from EC

- Total Soluble Salts (mg L^{-1} or PPM) = EC * 640 (EC 0.1 – 5.0 dS m^{-1})
- Total Soluble Salts (mg L^{-1} or PPM) = EC * 800 (EC >5.0 dS m^{-1})
- Total Soluble Salts (meq L^{-1})= EC * 10 (EC 0.15 – 5.0 dS m^{-1})